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WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201			KENNEDY, JENNIFER M	
			ART UNIT	PAPER NUMBER
			2812	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/629,011

Applicant(s)

DOAN ET AL.

Examiner

Jennifer M. Kennedy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 May 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 64-99 is/are pending in the application.
- 4a) Of the above claim(s) 82, 84, 85, 94-97 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 64-71 is/are allowed.
- 6) ☒ Claim(s) 72-81, 83, 86-93, 98 and 99 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/28/03, 11/17/04, 3/17/05, 5/19/05
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Applicant's election of claims 64, 65, 68-83, 86-93, 98, 99 in the reply filed on January 24, 2005 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

In response to this election the examiner sent out a Notice of Non-Responsive stating that at least one of the claims did not belong to the elected species. The examiner pointed to claim 68 and intended to juxtapose the limitation of claim 68 of "commencing application of said energy to the chamber at an increasing power level up to said plasma capable power level *after* commencing flow of the second precursor gas to the chamber" and claim 83 recitation of "commencing the increasing *after* commencing the second precursor gas flowing", with claim 82, which recites "commencing the increasing *prior* to commencing the second precursor gas flowing".

After reading Applicants statements filed May 4, 2005, studying the elected species represented by Figure 8 and the instant application's specification further, the examiner believes claim 82 was incorrectly identified as reading on the elected species. The examiner notes that her position was not clearly stated in the non-responsive communication sent April 22, 2005, and in the interests of furthering prosecution has provided an action on the merits. Claims 82, 84, 85, 94, 95, 96, and 97 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected species, there being no allowable generic or linking claim.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 72-80, 83, 86, 88-92, and 99 are rejected under 35 U.S.C. 102(e) as being anticipated by Meng et al. (U.S. Appl. No. 2004/00038525).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

In re claim 72, Meng et al. disclose an atomic layer deposition method, comprising:

positioning a semiconductor substrate within a deposition chamber (see entire disclosure, especially paragraph [0039] and Figure 3);

flowing a first precursor gas effective to form a first monolayer on the substrate (see paragraph [0039] and Figure 3);

after forming the first monolayer, flowing a second precursor gas to the substrate under plasma conditions within the chamber effective to form a second monolayer on the substrate which is different in composition from the first monolayer, the second precursor gas being different in composition from the first precursor gas, plasma generation of the second precursor gas within the chamber occurring from a second applied power of energy to the chamber, and further comprising applying a steady state first applied power of said energy to the chamber prior to applying the said second applied power of said energy, the steady state first applied power being less than the second applied power and increasing the first applied power to said second to the chamber prior to applying applied power (see paragraph [0039] and Figure 3).

In re claim 73, Meng et al. disclose the method wherein said increasing is continuous (see Figure 3).

In re claim 74, Meng et al. disclose the method wherein the steady state first power is insufficient to generate plasma from flowing the second precursor gas (see paragraph [0039] and Figure 3).

In re claim 75, Meng et al. disclose the method wherein the steady state first power is insufficient to generate plasma from flowing the first precursor gas (see paragraph [0039] and Figure 3).

In re claim 76, Meng et al. disclose the method comprising applying the steady state first power during the first precursor flowing (see paragraph [0039] and Figure 3).

In re claim 77, Meng et al. disclose the method wherein the steady state first power is insufficient to generate plasma from the flowing first precursor gas (see paragraph [0039] and Figure 3).

In re claim 78, Meng et al. disclose the method comprising flowing an inert purge gas to the chamber intermediate the first and second precursor gas flowings (see paragraph [0039] and Figure 3).

In re claim 79, Meng et al. disclose the method comprising applying the steady state first power during the inert purge gas flowing (see paragraph [0039] and Figure 3).

In re claim 80, Meng et al. disclose the method comprising flowing an inert purge gas to the chamber after the second precursor gas flowing, applying the steady state first power during the inert purge gas flowing intermediate the first and second precursor gas flowings and applying the steady state first power during the inert purge gas flowing after the second precursor flowing (see paragraph [0039] and Figure 3).

In re claim 83, Meng et al. disclose the method comprising commencing the increasing after commencing the second precursor gas flowing (see paragraph [0039] and Figure 3).

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In re claim 86, Meng et al. disclose the method comprising reducing power to the steady state first power prior to a ceasing flow of the second precursor gas (see paragraph [0039] and Figure 3).

In re claim 88, Meng et al. disclose an atomic layer deposition method, comprising:

positioning a semiconductor substrate within a deposition chamber (see entire disclosure, especially paragraph [0039] and Figure 3);

applying a base power level of energy to the chamber with the substrate positioned therein (see paragraph [0039] and Figure 3) ;

while applying the base power level of energy, flowing a first precursor gas to the substrate within the chamber effective to form a first monolayer on the substrate under non-plasma conditions within the chamber (see paragraph [0039] and Figure 3);

after forming the first monolayer, raising the base power level of said energy to a power level capable of generating plasma within the chamber (see paragraph [0039] and Figure 3);

flowing a second precursor gas to the substrate within the chamber while said plasma capable power level of said energy is applied to the chamber effective to form a plasma with said second precursor gas against the first monolayer to form a second monolayer on the substrate which is different in composition from the first monolayer(see paragraph [0039] and Figure 3); and

after forming the second monolayer, reducing the plasma capable power level of said energy to the base power level and thereafter depositing another monolayer onto the second monolayer (see last sentence of paragraph [0039] and Figure 3) .

In re claim 89, Meng et al. disclose the method wherein said raising is continuous (see paragraph [0039] and Figure 3).

In re claim 90, Meng et al. disclose the method of claim 88 comprising flowing an inert purge gas to the chamber intermediate the first and second precursor gas flowings (see paragraph [0039] and Figure 3).

In re claim 91, Meng et al. disclose the method comprising applying the base power level of energy during the inert purge gas flowing (see paragraph [0039] and Figure 3).

In re claim 92, Meng et al. disclose the method comprising flowing an inert purge gas to the chamber after the second precursor gas flowing, applying the base power level of energy during the inert purge gas flowing intermediate the first and second precursor gas flowings and applying the base power level of energy during the inert purge gas flowing after the second precursor flowing (see paragraph [0039] and Figure 3).

In re claim 98, Meng et al. disclose the method comprising commencing said reducing prior to a ceasing flow of the second precursor gas (see paragraph [0039] and Figure 3).

Claims 72-81, 83, 86-93, 98, and 99 are rejected under 35 U.S.C. 102(e) as being anticipated by Chiang et al. (U.S. Patent No. 6,416,822), hereinafter referred to as Chiang '822.

In re claim 72, Chiang '822 disclose an atomic layer deposition method, comprising:

positioning a semiconductor substrate within a deposition chamber (see Figure 1);

flowing a first precursor gas effective to form a first monolayer on the substrate (see Figure 3B);

after forming the first monolayer, flowing a second precursor gas to the substrate under plasma conditions within the chamber effective to form a second monolayer on the substrate which is different in composition from the first monolayer, the second precursor gas being different in composition from the first precursor gas, plasma generation of the second precursor gas within the chamber occurring from a second applied power of energy to the chamber, and further comprising applying a steady state first applied power of said energy to the chamber prior to applying the said second applied power of said energy, the steady state first applied power being less than the second applied power and increasing the first applied power to said second to the chamber prior to applying applied power (see Figure 3B and column 10, line 43 through column 11, line 5).

In re claim 73, Chiang '822 disclose the method wherein said increasing is continuous (see Figure 3B).

In re claim 74, Chiang '822 disclose the method wherein the steady state first power is insufficient to generate plasma from flowing the second precursor gas (see Figure 3B and column 10, line 43 through column 11, line 5).

In re claim 75, Chiang '822 disclose the method wherein the steady state first power is insufficient to generate plasma from flowing the first precursor gas (see Figure 3B and column 10, line 43 through column 11, line 5).

In re claim 76, Chiang '822 disclose the method comprising applying the steady state first power during the first precursor flowing (see Figure 3B and column 10, line 43 through column 11, line 5).

In re claim 77, Chiang '822 disclose the method wherein the steady state first power is insufficient to generate plasma from the flowing first precursor gas (see Figure 3B and column 10, line 43 through column 11, line 5).

In re claim 78, Chiang '822 disclose the method comprising flowing an inert purge gas to the chamber intermediate the first and second precursor gas flowings (see Figure 3B, column 7, lines 14-20 and column 7, line 65 through column 8, line 5). The examiner notes that precursor B is H₂ in one embodiment and that the inert H₂ acts as a purge gas at steady state ion energy application and acts as a reactant during the second applied power ion energy application (see Figure 3B).

In re claim 79, Chiang '822 disclose the method comprising applying the steady state first power during the inert purge gas flowing (see Figure 3B, column 7, lines 14-20 and column 7, line 65 through column 8, line 5).

In re claim 80, Chiang '822 disclose the method comprising flowing an inert purge gas to the chamber after the second precursor gas flowing, applying the steady state first power during the inert purge gas flowing intermediate the first and second precursor gas flowings and applying the steady state first power during the inert purge gas flowing after the second precursor flowing (see Figure 3B, column 7, lines 14-20 and column 7, line 65 through column 8, line 5).

In re claim 81, Chiang '822 disclose the method wherein the plasma conditions comprise surface microwave plasma (see column 5, line 65 through column 6, line 5 and column 6, line 20-30).

In re claim 83, Chiang '822 disclose the method comprising commencing the increasing after commencing the second precursor gas flowing (see Figure 3B).

In re claim 86, Chiang '822 disclose the method comprising reducing power to the steady state first power prior to a ceasing flow of the second precursor gas (see Figure 3B).

In re claim 87, Chiang '822 disclose the method wherein the first precursor gas comprises TiCl_4 , the first monolayer comprises TiCl_x , and the second precursor gas comprises H_2 (column 7, lines 14-20 and column 7, line 65 through column 8, line 5).

In re claim 88, Chiang '822 disclose an atomic layer deposition method, comprising:

positioning a semiconductor substrate within a deposition chamber (see Figure 1);

applying a base power level of energy to the chamber with the substrate positioned therein (see Figure 3B);

while applying the base power level of energy, flowing a first precursor gas to the substrate within the chamber effective to form a first monolayer on the substrate under non-plasma conditions within the chamber (see Figure 3B);

after forming the first monolayer, raising the base power level of said energy to a power level capable of generating plasma within the chamber (see Figure 3B);

flowing a second precursor gas to the substrate within the chamber while said plasma capable power level of said energy is applied to the chamber effective to form a plasma with said second precursor gas against the first monolayer to form a second monolayer on the substrate which is different in composition from the first monolayer (see Figure 3B and column 10, line 43 through column 11, line 5); and

after forming the second monolayer, reducing the plasma capable power level of said energy to the base power level and thereafter depositing another monolayer onto the second monolayer (see Figure 3B and column 11, lines 40-49 and column 6, lines 35-45).

In re claim 89, Chiang '822 disclose the method wherein said raising is continuous (see Figure 3B).

In re claim 90, Chiang '822 disclose the method of claim 88 comprising flowing an inert purge gas to the chamber intermediate the first and second precursor gas flowings (see Figure 3B, column 7, lines 14-20 and column 7, line 65 through column 8, line 5). The examiner notes that precursor B is H₂ in one embodiment and that the inert

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H₂ acts as a purge gas at steady state ion energy application and acts as a reactant during the second applied power ion energy application (see Figure 3B).

In re claim 91, Chiang '822 disclose the method comprising applying the base power level of energy during the inert purge gas flowing (see Figure 3B).

In re claim 92, Chiang '822 disclose the method comprising flowing an inert purge gas to the chamber after the second precursor gas flowing, applying the base power level of energy during the inert purge gas flowing intermediate the first and second precursor gas flowings and applying the base power level of energy during the inert purge gas flowing after the second precursor flowing (see Figure 3B).

In re claim 93, Chiang '822 disclose the method wherein the plasma comprises surface microwave plasma (see column 5, line 65 through column 6, line 5 and column 6, line 20-30).

In re claim 98, Chiang '822 disclose the method comprising commencing said reducing prior to a ceasing flow of the second precursor gas (see Figure 3B).

In re claim 99, Chiang '822 disclose the method wherein the first precursor gas comprises TiCl₄, the first monolayer comprises TiCl_x, and the second precursor gas comprises H₂ (column 7, lines 14-20 and column 7, line 65 through column 8, line 5).

Claims 72-80, 83, 86-92, 98, and 99 are rejected under 35 U.S.C. 102(e) as being anticipated by Chiang et al. (U.S. Patent No. 6,630,201), hereinafter referred to as Chiang '201.

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In re claim 72, Chiang '201 disclose an atomic layer deposition method, comprising:

positioning a semiconductor substrate within a deposition chamber (see column 26, line 30 through column 28, line 65 and column 30, lines 2-27);

flowing a first precursor gas effective to form a first monolayer on the substrate;

after forming the first monolayer, flowing a second precursor gas to the substrate under plasma conditions within the chamber effective to form a second monolayer on the substrate which is different in composition from the first monolayer, the second precursor gas being different in composition from the first precursor gas, plasma generation of the second precursor gas within the chamber occurring from a second applied power of energy to the chamber, and further comprising applying a steady state first applied power of said energy to the chamber prior to applying the said second applied power of said energy, the steady state first applied power being less than the second applied power and increasing the first applied power to said second to the chamber prior to applying applied power (see Figure 37(a)-(c)).

In re claim 73, Chiang '201 disclose the method wherein said increasing is continuous (see Figure 37(a)-(c)).

In re claim 74, Chiang '201 disclose the method wherein the steady state first power is insufficient to generate plasma from flowing the second precursor gas (see Figure 37(a)-(c) and column 30, lines 15-29).

In re claim 75, Chiang '201 disclose the method wherein the steady state first power is insufficient to generate plasma from flowing the first precursor gas (see Figure 37(a)-(c) and column 30, lines 15-29).

In re claim 76, Chiang '201 disclose the method comprising applying the steady state first power during the first precursor flowing (see Figure 37(a)-(c) and column 30, lines 15-29).

In re claim 77, Chiang '201 disclose the method wherein the steady state first power is insufficient to generate plasma from the flowing first precursor gas (see Figure 37(a)-(c) and column 30, lines 15-29).

In re claim 78, Chiang '201 disclose the method comprising flowing an inert purge gas to the chamber intermediate the first and second precursor gas flowings. The examiner notes that second precursor is H_2 and that the inert H_2 acts as a purge gas at steady state ion energy application and acts as a reactant during the second applied power ion energy application (see Figure 37 (a)-(c) and column 30, lines 15-29).

In re claim 79, Chiang '201 disclose the method comprising applying the steady state first power during the inert purge gas flowing (see Figure 37 (a)-(c) and column 30, lines 15-29).

In re claim 80, Chiang '201 disclose the method comprising flowing an inert purge gas to the chamber after the second precursor gas flowing, applying the steady state first power during the inert purge gas flowing intermediate the first and second precursor gas flowings and applying the steady state first power during the inert purge

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gas flowing after the second precursor flowing (see Figure 37 (a)-(c) and column 30, lines 15-29).

In re claim 83, Chiang '201 disclose the method comprising commencing the increasing after commencing the second precursor gas flowing (see Figure 37 (a)-(c) and column 30, lines 15-29).

In re claim 86, Chiang '201 disclose the method comprising reducing power to the steady state first power prior to a ceasing flow of the second precursor gas (see Figure 37 (a)-(c) and column 30, lines 15-29).

In re claim 87, Chiang '201 disclose the method wherein the first precursor gas comprises TiCl_4 , the first monolayer comprises TiCl_x , and the second precursor gas comprises H_2 (see column 27, lines 10-60).

In re claim 88, Chiang '201 disclose an atomic layer deposition method, comprising:

positioning a semiconductor substrate within a deposition chamber (see column 26, line 30 through column 28, line 65 and column 30, lines 2-27);

applying a base power level of energy to the chamber with the substrate positioned therein;

while applying the base power level of energy, flowing a first precursor gas to the substrate within the chamber effective to form a first monolayer on the substrate under non-plasma conditions within the chamber;

after forming the first monolayer, raising the base power level of said energy to a power level capable of generating plasma within the chamber;

flowing a second precursor gas to the substrate within the chamber while said plasma capable power level of said energy is applied to the chamber effective to form a plasma with said second precursor gas against the first monolayer to form a second monolayer on the substrate which is different in composition from the first monolayer (see Figure 37(a)-(c)); and

after forming the second monolayer, reducing the plasma capable power level of said energy to the base power level and thereafter depositing another monolayer onto the second monolayer (see column 27, lines 44-46).

In re claim 89, Chiang '201 disclose the method wherein said raising is continuous (see Figure 37(a)-(c)).

In re claim 90, Chiang '201 disclose the method of claim 88 comprising flowing an inert purge gas to the chamber intermediate the first and second precursor gas flowings. The examiner notes that second precursor is H_2 and that the inert H_2 acts as a purge gas at steady state ion energy application and acts as a reactant during the second applied power ion energy application (see Figure 37 (a)-(c) and column 30, lines 15-29).

In re claim 91, Chiang '201 disclose the method comprising applying the base power level of energy during the inert purge gas flowing (see Figure 37 (a)-(c) and column 30, lines 15-29).

In re claim 92, Chiang '201 disclose the method comprising flowing an inert purge gas to the chamber after the second precursor gas flowing, applying the base power level of energy during the inert purge gas flowing intermediate the first and second precursor gas flowings and applying the base power level of energy during the inert purge gas flowing after the second precursor flowing (see Figure 37 (a)-(c) and column 30, lines 15-29).

In re claim 98, Chiang '201 disclose the method comprising commencing said reducing prior to a ceasing flow of the second precursor gas (see Figure 37 (a)-(c).

In re claim 99, Chiang '201 disclose the method wherein the first precursor gas comprises TiCl_4 , the first monolayer comprises TiCl_x , and the second precursor gas comprises H_2 (see column 27, lines 10-60).

Claims 72-80, 83, 86-92, 98, and 99 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al. (U.S. Appl. No. 2003/0143328).

In re claim 72, Chen et al. disclose an atomic layer deposition method, comprising:

positioning a semiconductor substrate (110) within a deposition chamber (see Figure 2);

flowing a first precursor gas effective to form a first monolayer on the substrate (see paragraph [0055]-[0061]);

after forming the first monolayer, flowing a second precursor gas to the substrate under plasma conditions within the chamber effective to form a second monolayer on the substrate which is different in composition from the first monolayer, the second precursor gas being different in composition from the first precursor gas, plasma generation of the second precursor gas within the chamber occurring from a second applied power of energy to the chamber, and further comprising applying a steady state first applied power of said energy to the chamber prior to applying the said second applied power of said energy, the steady state first applied power being less than the second applied power and increasing the first applied power to said second to the chamber prior to applying applied power (see Figures 6 or 10 and accompanying explanations).

In re claim 73, Chen et al. disclose the method wherein said increasing is continuous (see Figure 6 or 10).

In re claim 74, Chen et al. disclose the method wherein the steady state first power is insufficient to generate plasma from flowing the second precursor gas (see Figure 6 or 10 and [0055] and [0056]).

In re claim 75, Chen et al. disclose the method wherein the steady state first power is insufficient to generate plasma from flowing the first precursor gas (see Figure 6 or 10 and [0055] and [0056]).

In re claim 76, Chen et al. disclose the method comprising applying the steady state first power during the first precursor flowing (see Figure 6 or 10 and [0055] and [0056]).

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In re claim 77, Chen et al. disclose the method wherein the steady state first power is insufficient to generate plasma from the flowing first precursor gas (see Figure 6 or 10 and [0055] and [0056]).

In re claim 78, Chen et al. disclose the method comprising flowing an inert purge gas to the chamber intermediate the first and second precursor gas flowings (see Figure 6 or 10 and [0055] and [0056]).

In re claim 79, Chen et al. disclose the method comprising applying the steady state first power during the inert purge gas flowing (see Figure 6 or 10 and [0055] and [0056]).

In re claim 80, Chen et al. disclose the method comprising flowing an inert purge gas to the chamber after the second precursor gas flowing, applying the steady state first power during the inert purge gas flowing intermediate the first and second precursor gas flowings and applying the steady state first power during the inert purge gas flowing after the second precursor flowing (see Figure 6 or 10 and [0055] and [0056]).

In re claim 83, Chen et al. disclose the method comprising commencing the increasing after commencing the second precursor gas flowing (see Figure 6 or 10 and [0055] and [0056]).

In re claim 86, Chen et al. disclose the method comprising reducing power to the steady state first power prior to a ceasing flow of the second precursor gas (see Figure 6 or 10 and [0055] and [0056]).

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In re claim 87, Chen et al. disclose the method wherein the first precursor gas comprises TiCl_4 , the first monolayer comprises TiCl_x , and the second precursor gas comprises H_2 (see paragraph [0055]).

In re claim 88, Chen et al. disclose an atomic layer deposition method, comprising:

positioning a semiconductor substrate (110) within a deposition chamber (see Figure 2);

applying a base power level of energy to the chamber with the substrate positioned therein (see Figure 6 or 10);

while applying the base power level of energy, flowing a first precursor gas to the substrate within the chamber effective to form a first monolayer on the substrate under non-plasma conditions within the chamber (see Figure 6 or 10);

after forming the first monolayer, raising the base power level of said energy to a power level capable of generating plasma within the chamber (see Figure 6 or 10);

flowing a second precursor gas to the substrate within the chamber while said plasma capable power level of said energy is applied to the chamber effective to form a plasma with said second precursor gas against the first monolayer to form a second monolayer on the substrate which is different in composition from the first monolayer(see Figures 6 or 10 and paragraph [0055]-[0061]) ; and

after forming the second monolayer, reducing the plasma capable power level of said energy to the base power level and thereafter depositing another monolayer onto the second monolayer (see Figure 6 or 10 and last sentence of [0060]).

In re claim 89, Chen et al. disclose the method wherein said raising is continuous (see Figure 6 or 10).

In re claim 90, Chen et al. disclose the method of claim 88 comprising flowing an inert purge gas to the chamber intermediate the first and second precursor gas flowings (see Figure 6 or 10 and [0055] and [0056]).

In re claim 91, Chen et al. disclose the method comprising applying the base power level of energy during the inert purge gas flowing (see Figure 6 or 10 and [0055] and [0056]).

In re claim 92, Chen et al. disclose the method comprising flowing an inert purge gas to the chamber after the second precursor gas flowing, applying the base power level of energy during the inert purge gas flowing intermediate the first and second precursor gas flowings and applying the base power level of energy during the inert purge gas flowing after the second precursor flowing (see Figure 6 or 10 and [0055] and [0056]).

In re claim 98, Chen et al. disclose the method comprising commencing said reducing prior to a ceasing flow of the second precursor gas (see Figure 6 or 10 and [0055] and [0056]).

In re claim 99, Chen et al. disclose the method wherein the first precursor gas comprises TiCl_4 , the first monolayer comprises TiCl_x , and the second precursor gas comprises H_2 (see paragraph [0055]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 81 and 93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Meng et al. (U.S. Appl. No. 2004/0038525) in view of Chiang et al. (U.S. Patent No. 6,416,822), hereinafter referred to as Chiang '822.

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and

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reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

In re claims 81 and 93, Meng et al. disclose the method as claimed and rejected above, but do not disclose the method of using surface microwave plasma conditions. Chiang '822 disclose the method of using surface microwave plasma conditions (see column 5, line 65 through column 6, line 5 and column 6, line 20-30). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize surface microwave plasma conditions in the method of Meng et al. because as Chiang '822 disclose, microwave energy can be more efficiently transferred to ionizing electrodes, leading to higher ionization fractions.

Claims 81 and 93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chiang et al. (U.S. Patent No. 6,660,201), hereinafter referred to as Chiang '201, in view of Chiang et al. (U.S. Patent No. 6,416,822), hereinafter referred to as Chiang '822.

In re claims 81 and 93, Chiang '201 disclose the method as claimed and rejected above, including surface plasma conditions, but do not disclose the method of using surface microwave plasma conditions. Chiang '822 disclose the method of using surface microwave plasma conditions (see column 5, line 65 through column 6, line 5 and column 6, line 20-30). It would have been obvious to one of ordinary skill in the art

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at the time the invention was made to utilize surface microwave plasma conditions in the method of Chiang '201, because as Chiang '822 disclose, microwave energy can be more efficiently transferred to ionizing electrodes, leading to higher ionization fractions.

Claims 81 and 93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Appl. No. 2003/0143328) in view of Chiang et al. (U.S. Patent No. 6,416,822), hereinafter referred to as Chiang '822.

In re claims 81 and 93, Chen et al. disclose the method as claimed and rejected above, but do not disclose the method of using surface microwave plasma conditions. Chiang '822 disclose the method of using surface microwave plasma conditions (see column 5, line 65 through column 6, line 5 and column 6, line 20-30). It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize surface microwave plasma conditions in the method of Chen et al. because as Chiang '822 disclose, microwave energy can be more efficiently transferred to ionizing electrodes, leading to higher ionization fractions.

Allowable Subject Matter

Claims 64-71 are allowed.

The following is an examiner's statement of reasons for allowance: the prior art, either singly or in combination, fails to anticipate or render obvious, the and atomic layer deposition method including the limitations of after flowing the inert purge gas, flowing a second precursor gas to the substrate under plasma conditions within the chamber, the second precursor gas flowing under plasma conditions within the chamber commencing

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